

In other words, the connection between users and ESPs consume a disproportionately large amount of switching capacity compared to other connections established by the local exchange circuit switch. As much of the cost associated with the switching function is usage sensitive, LECs must be able to price switching services to ISPs in a manner which reflects their cost causation.²⁴

B. Case Studies In Network Blockage

U S WEST also conducted a study to determine the network impact of the holding time patterns of ESPs described in the previous section. This study involved examination of six wire centers in selected locations with significant ISP presence. The results of this study are set forth in Exhibit B. The study concludes that usage of the Internet by local exchange end users through the circuit switched network is having "an increasingly volatile impact upon U S WEST Communication's telecommunications network." In all offices, significant increased blockage attributable to Internet access via the local exchange networks was identified -- both for Internet users and for other users. Additional trunking and investment is documented as generally necessary to alleviate such blockage.

Internet users have a major impact on the traffic patterns and usage characteristics on the Public Switched Telephone Network ("PSTN"). This is

²⁴ An argument can be made that these extraordinary switching costs are really not caused by the ESP but by the end-user customer. As a general proposition, the major cause of the cost is the ESP. LECs should, however, be free to derive other rational solutions. In this docket, the Commission has observed that "usage-sensitive charges might better reflect the way incumbent LECs incur costs . . . [and

mainly due to the increased holding times when compared to the “normal” voice call.

Normal engineering procedures no longer meet the demand being put onto the network. Busy hours are turning into busy days with very little relief from 9:00 AM until midnight. When the Internet traffic and the “normal” voice traffic are both vying for the same common equipment, service implications are felt by all customers.

With flat-rate offerings, there is no incentive for Internet users to release the equipment while it is not in use. Many connections remain up for 24 hours a day for an entire week.

When an ISP does not have the capability to complete the number of calls generated by its advertising, the inability of callers to reach the ISP stimulates multiple retrials or non-productive calls. With the current modem technology, the computers can generate retrials on a regular, continual basis until a connection is finally made. These non-productive calls use network capacity and add to the demand on the equipment which ultimately results in blockages where calls cannot complete to their destinations.

ISPs are not distinguishable by the services they buy, the number of lines they order, the company name, or the location they choose. It is difficult to predict where they will appear and the traffic patterns they will stimulate. Therefore, providing capacity becomes more of a reactive event than a proactive exercise.

that] usage-sensitive charges may best reflect cost causation principles.” Notice ¶
73.

ISPs' pricing changes or other special offerings are also unpredictable, but have major impacts on the demand and provoke major shifts in traffic patterns.

IV. PROBLEMS INHERENT IN CURRENT SYSTEM

A. Regulatory Issues

The ESP exemption creates a number of anomalies from a regulatory perspective which merit attention. These anomalies derive from both the end-user status of all ESPs as well as the way such status interacts with the existing interstate access charge system.

- First, a considerable amount of ESP/Internet usage is interstate in nature (although, as noted above, just how to measure such usage in a packet switching environment is problematic). However, because of the manner in which the ESP exemption operates, all of this usage is calculated as intrastate for separations purposes, and investment and expenses utilized by LECs to provide interstate services are instead driven to the intrastate jurisdiction. U S WEST estimates that with the conservative usage projection and the current investment base, \$162 million of investment will be reallocated to the state jurisdiction for cost recovery by 2001. This would be jurisdictionally interstate if ISP usage were assigned as interstate under existing separations rules.
- To the extent that ESP usage puts disproportionate usage demands on LECs' switches and the costs incurred by LECs in accommodating that extra usage,

other users are in effect subsidizing ESP usage. Such subsidies are inconsistent with Section 254(k) of the 1996 Act and are generally poor public policy.

- U S WEST submits that the carrier/non-carrier distinction has perhaps assumed a far too prominent place in the Commission's regulatory lexicon. Originally it made sense to rely on this distinction in permitting the development of private networks,²⁵ and recognizing the fact that telecommunications service could be provided in an economical manner without the service provider holding itself out to serve the entire public on a non-discriminatory basis.²⁶ But now it seems that the entire economics of a service will often depend on the Commission's vision of how the carrier/non-carrier distinction ought to be made -- even though the original assessment of carrier status (carriage for others on a non-discriminatory basis) seems to have been totally discarded. Certainly in the case of ESPs, non-carrier status is determined entirely on the basis of transmission technology, not offering characteristics (although we agree that many, if not most, ESPs would be able to obtain non-carrier status on other bases as well as ESP status). The point is that the regulatory implications of the status of a provider of telecommunications services as a carrier or as a non-carrier are enormous, while the basis for making such a determination by the Commission is generally result oriented and undisciplined. U S WEST submits that this problem deserves

²⁵ In the Matter of Allocation of Frequencies in the Bands Above 890 Mc. Report and Order, 27 FCC 359 (1959); 20 FCC 825 (1960), Microwave Communications, Inc., 18 FCC 2d 953 (1969), recons. denied, 21 FCC 2d 190 (1970).

²⁶ Wold Communications, Inc. v. FCC, 735 F.2d 1465, 1475 (D.C. Cir. 1984).

immediate attention, and that further action concerning ESPs by way of an immediate and expedited NPRM provides the proper vehicle for proceeding.

- The ESP exemption and Internet usage present unique and extremely significant jurisdictional issues which must be resolved. As is noted above, the percentage of time that a call between an end user and an ISP which is actually engaged in making an interstate communication is likely to be fairly small, in at least some instances. Moreover, Internet technology is such that it is not technically feasible to match Internet addresses with geographic locations. In short, it may be infeasible to actually match interstate usage and ESP connect time to LECs' switches. In such a case, the Commission could ascribe a percentage of Internet connect time as interstate, or to simply assume that the dominant purpose of Internet connection is interstate and assign the entire connection to the interstate jurisdiction. On the other hand, the Commission might wish to assign the entirety of Internet access to the intrastate jurisdiction.
- Given the diversity of ESPs now providing service, it would probably be difficult to assign jurisdictional characteristics to the entire ESP industry as a whole. However, ISPs provide a sufficiently discrete class of ESPs that ISPs can be studied and dealt with directly.
- The ESP exemption has been problematic to a large extent because ESP jurisdiction has existed in a regulatory twilight zone. The Commission should move to clarify the jurisdictional status of ISPs and other ESPs providing substantial interstate services. Simply because usage cannot be measured on a

jurisdictional basis is no reason not to address the issues which the services raise.

- It is important to realize that ESPs are not the only entities using LECs' switching facilities for interstate communications without paying usage sensitive rates for their imposition of usage sensitive costs. Private networks operate in the same regulatory milieu as do ESPs, and all indications are that private firm connections (to a large extent in a "telecommuting" context) to the Internet via private connections and other connections to internal company-controlled computers and data bases have the ability to create the same network problems as do connections with ESPs.
- Finally, the problem of the "ESP exemption" must be seen for what it is and for what it is not. In essence, the ESP exemption is not an exemption at all. Rather, for a variety of conflicting technological and regulatory reasons (only some of which are attributable to the Commission), entities which connect circuit switched LEC networks with packet switched networks are able to put disproportionate strains on the traffic sensitive elements of LEC networks (primarily switching) while paying only flat-rate prices. Moreover, the regulatory device developed by the Commission for dealing with the interstate usage of LECs' switches in this context -- the special access surcharge -- has never worked, and cannot possibly work in the future due to market characteristics. The "solution" to the ESP exemption problem must simply be one based on the fundamental recognition that economic forces must be permitted to operate and that LECs must be able to bill users of any nature of

the traffic sensitive elements of LECs' networks in a manner which is reasonable and economical.

B. Economic Issues

It is obvious that proper economic principles would drive LECs to price ESP and ISP access to LECs' networks in a manner which reflected the additional usage sensitive costs imposed by their usage on LECs' switches. There is a corollary to this proposition: such pricing would in turn drive both LECs and ESPs to seek more efficient technological solutions to their service provisioning which reduced both the switching costs and the price paid by ESPs for switching. In today's environment, LECs are incurring these extra costs, but either not recovering them at all or recovering them from other customers. Thus, LECs would normally have the incentive to devise superior services for ESPs which both attracted them to remain on their networks and which provided service in a less costly (more efficient) manner. The ESP exemption discourages this normal operation of market forces by giving ESPs an artificial incentive to continue to seek solutions which are technologically inferior but are artificially inexpensive.

U S WEST continues to identify and evaluate new technologies which would be more compatible with the packet switched nature of Internet and other ESP transmissions. Several possible solutions include: modem pools, AIN rerouting, and ATM circuit emulation. Other solutions no doubt are within the realm of technology. However, solutions are costly. The existing ability of all ESPs to use the circuit switched network on a flat-rate basis means that there is little economic

or market incentive for ESPs to support technological solutions to problems which, from the ESPs' perspective, do not exist. Permitting LECs' prices to be established which send proper economic signals to ESPs and LECs alike can go a long way towards improving ESP and LEC technology and the nation's access to the benefits of new information technology and the new information market.

In a nutshell, any technologically and economically efficient solution would focus on avoiding the conflict between the time sensitive circuit switch service and the time insensitive packet switch -- a mismatch which has meaning only because the usage of the circuit switch is not billed to the packet switch provider.

V. CONCLUSION AND RECOMMENDATIONS

U S WEST recommends that the FCC immediately issue an expedited Notice of Proposed Rulemaking to resolve the issues raised in this Notice. We further recommend that the FCC establish a plan which accommodates the needs of LECs to properly recover the traffic sensitive costs necessarily incurred in serving ESPs. This plan can properly be limited to those ESPs which interconnect LECs' circuit networks with data networks using packet technology. The following principles should guide the rulemaking:

- To the extent that the ESP exemption is viewed as an actual exemption from the payment of access charges, it should be eliminated. There is no justification for the Commission to exempt any class of user from payment of any proper LEC charges solely on the basis of the technology that class employs.

- The FCC can either deal with the ESP exemption problem at the interstate level or advise state regulators that they have full flexibility to deal with the issue of pricing ESP access to local exchange networks at the intrastate level. In the latter case, the state conclusion would be binding.
- The current subsidy laden interstate access structure is undergoing reform. Any analysis of the impact of charging classes of ESPs interstate switched access charges for their interstate use of local exchange switching facilities must be evaluated in the context of the new access charge structure. A transition may be necessary.
- If interstate access charges are priced based at realistic market levels, the controversy surrounding the possibility that interstate carriers' carrier charges will be assessed to interstate ESP traffic will be considerably diminished.
- Any FCC action must take account of the ability of "one-way carriers" to collect, but not pay, reciprocal compensation for terminating traffic.
- The FCC can lawfully declare all ISPs as subject to FCC regulation, or subject to state regulation, based on public interest and policy considerations.
- The ESP exemption problem is one of flat-rated recovery for traffic sensitive costs. Given the FCC's constant recognition that such a recovery is wasteful and inefficient, moving toward an economic solution is completely consistent with the FCC's overall position on pricing of services.
- Given the dynamics of the marketplace, LECs must be given significant flexibility to deal with ESP-imposed traffic costs unique to their own markets. An overly rigid regulatory structure to deal with the problems caused by ESP

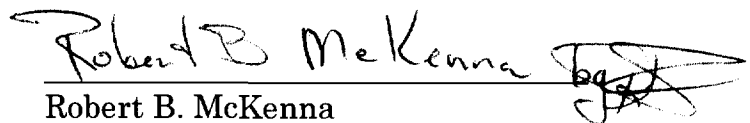
usage of local exchange networks would probably cause even more problems as markets and technologies change.

We suggest that the NPRM propose that ISPs and other ESPs which mediate between circuit switched and data switched networks pay interstate switched access on all of their traffic after the transition to cost-based access prices has been completed. However, the NPRM should emphasize that this solution is only one of a number of possible solutions. In this regard, the NPRM should also emphasize that the problem is not one of exemptions or one of classes of users freeloading on existing networks. The problem instead is a simple mismatch between technologies which lead, in the current regulatory milieu, to data networks putting an excessive strain on circuit networks for which there is no rational cost recovery mechanism in place.

Respectfully submitted,

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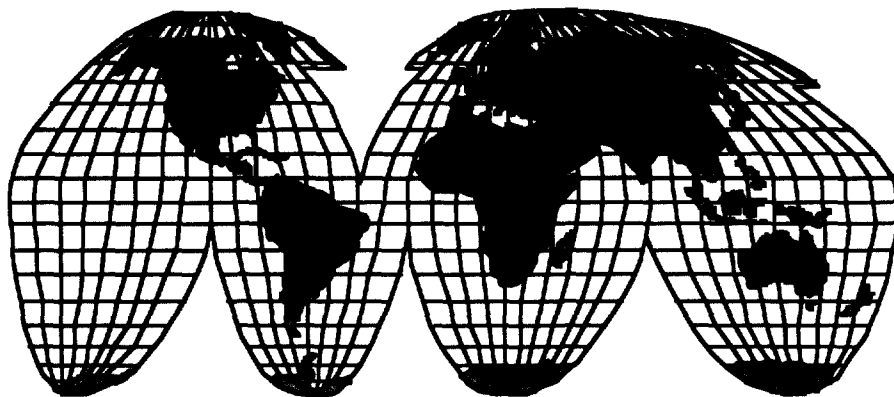
Its Attorney

Of Counsel,
Dan L. Poole

March 24, 1997

EXHIBIT A

ENHANCED SERVICE PROVIDERS (ESPs) STUDY



IMPACTS OF THE INTERNET ON U S WEST's PSTN

Mark Holling - Product Manager, Switched Services

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Overview

Enhanced services are offered over common carrier facilities and use computer processing to do 'something' to the information being transmitted. Enhanced Service Providers (ESPs) can include: Internet Service Providers (ISPs), VANs, E-Mail, on-line services, Electronic Data Interchange (EDI), transactional services, Interactive Voice Response (IVR), enhanced facsimile, voice mail and alarm/telemetry companies. These service providers have been exempt from paying access charges since the mid-80's. The explosive growth of the Internet and the corresponding problems which are occurring in the network has raised the impacts of this aging temporary exemption to a new crisis level.

Although it was intuitively obvious that this increased usage of the network was responsible for service problems and excessive capital deployment, evidence was of an anecdotal nature. In the fall of 1995 we began a project to perform network studies on over 6,000 of the 98,000 ESP lines in U S WEST. Studies were conducted on four types of ESPs, Value Added Networks (VANs), Bulletin Board Services (BBS), On-line Providers (OLP) and Internet Service Providers (ISP). Each ESP line was studied 24 hours a day, 7 days a week, for 4 weeks. The studies began in February 1996 and concluded in August 1996.

Preliminary results of the study were shared with the FCC on 6-28-96 and final results on 10-1-96. It should also be noted that the results of this study, while alarming, was completed prior to major ISP flat rate offerings in December of 1996 and therefore may be understating the problem. Study results include:

- ESPs use the network up to eight times more than the office average during the busy hour.
- The average holding time per call for ESPs is 14 minutes.
- Over 40% of ESP calls are longer than 5 minutes, while only 16% of residence and 8% of business calls are longer than 5 minutes.
- ESPs have consistently longer calls than typical residence and business users across all times of the day.
- Comparing ESPs to IXC's, ESPs usage per line is busier on a consistent basis.
- Studied central offices have 90% of their busy hours concentrated between 7am and 6pm, the majority of ESP busy hours (62%) are after 6pm.
- Current U S WEST TELRIC cost models assume approximately \$3 of monthly incremental usage costs for the average business line, ESP monthly incremental usage ranged up to eight times that of a business line.
- Estimates of line growth by the year 2001 range from 239,000 to almost 1.5 million. Usage estimates range from 34 billion to almost 199 billion in 2001.

Introduction

The introduction of WWW browsers such as Netscape and Mosaic have led to explosive growth of the Internet as it has become available to consumers almost overnight. LECs carry the modem traffic from the end user to the Internet Service Provider and we have born the brunt of this explosive growth and its increased demand in lines and usage. Capital expenditures are rising rapidly and our network is beginning to experience blockage in numerous locations.

Industry claims of increased blockage, customer complaints and excessive capital deployment, while true, have been mostly anecdotal in nature. In order to convince the regulators that action is required we needed some real numbers.

A network traffic study of ESP lines began in February of 1996 and concluded in August to gather the 'real' data needed to prove our case. The study is complete and the results have been invaluable in discussions with the FCC and for internal planning.

Background

Businesses classified as Enhanced Service Providers include Internet Service Provider (ISPs), VANs, E-Mail, on-line services, Electronic Data Interchange (EDI), transactional services, Interactive Voice Response (IVR), enhanced facsimile, voice mail and alarm/telemetry companies.

The FCC, in its 1983 access charge proceedings excluded ESPs from paying access charges. The issue has sat relatively dormant until several recent events occurred which brought it into the limelight. The explosive growth of the Internet began to occur in 1995 and 1996 (see Attachment 1 for a brief history of the Internet). As the Internet grew, LECs began to suffer from its growing pains in the form of increased blockage in switches, rising excess construction charges and a new type of customers (Internet Service Providers) who looked like an ordinary small business but had very different needs. As players like AT&T, MCI and Microsoft began getting into the Internet business, the logical assumption was that this growth would only accelerate.

The ESP Study

In the fall of 1995, U S WEST requested assistance from Bellcore in analyzing the ESP problem at a national level. A team was assembled consisting of representatives from U S WEST, Bell Atlantic, Pacific Bell, SNET, NYNEX and BellSouth. The team was to conduct an analysis of the ESP market with the following study goals:

1. Provide a supportable estimate of the total traffic generated on local networks by ESPs and provide a 5 year forecast, 1996 to 2000, that can be used to plan for network evolution and to assess the effects of the growth in traffic on existing and planned network facilities.

2. Provide a supportable network incremental cost estimate that illustrates the costs of provisioning and supporting ESP traffic associated with access architectures that are deployed. Since the ESP access architecture utilizes business access line services, the impact estimate should document the costs of serving ESPs vs. the average or typical business customer.

Team discussions and Bellcore's assistance enabled U S WEST to complete the original study goals and have provided results for several FCC contacts. NYNEX, Pacific and Bell Atlantic have also shared their study results with the FCC.

The first step in conducting our traffic studies was to identify the various ESPs in our territory. This was done using a variety of sources including input from product managers, previous market studies and lists of ESPs located on the Internet. By combining various Internet lists we have identified over 600 ESPs in US WEST with approximately 98,000 lines. During this identification process, strict measures were undertaken to avoid compromising any customer information.

Attachment 2 provides a graphical display of ESPs by type and state. To focus our study sample on ESPs which connect to the Internet or an on-line computer network, we concentrated on 4 specific types which are described in some detail below.

- 1) Value Added Networks (VAN) primarily provide transport for other ESPs such as America OnLine or Compuserve. There are two main VANs in the United States today, Tymnet and SprintNet. We estimate that VANs have 33,000 lines in our territory.
- 2) Bulletin Board Services (BBS) are predominately local in nature and interest may be tightly focused on specific machines or applications. We estimate 9,000 lines in U S WEST.
- 3) On-line Providers (OLP) such as Compuserve, America OnLine, and Prodigy were the precursor to the Internet. They provide a variety of services including chat rooms, special interest groups and e-mail. OLPs have also begun to provide access to the Internet. We estimated there are almost 14,000 lines associated with OLPs in our territory.
- 4) Internet Service Providers (ISP). This is a relatively new, and with over 42,000 lines, rapidly growing segment. These companies provide a link to the Internet for end users. They may also provide e-mail, personalized WEB pages, data storage and other vertical services. Large companies such as AT&T, IBM, UUNET, Netcom and the RBOCs are in or entering this business. The Interact product from U S WEST's !NTERPRISE is an example. There are numerous local ISPs advertised in every newspaper in the country. Flat rate pricing, at around \$20 per month for unlimited usage, is now becoming standard with players like AT&T and AOL.

After we identified the study universe, we then selected a robust sample of ESPs for the study. To provide a balanced sample we selected hunt groups for study using the following criteria:

- Study ESPs located in different sized states (based on access lines) and regions of the company: South Dakota - small (26%), Utah - medium (48%) and Washington/Colorado - large (26%) states
- Study all four types of ESPs identified (BBS - 16%, ISP - 48%, OLP - 16%, VAN - 20%)
- Select ESPs in both MSA and non-MSA locations (MSA - 86%, non-MSA - 14%)
- Select both national and local/regional ESPs (national - 48%, local/regional - 52%)
- Select ESPs in a variety of switches (5ESS - 33%, DMS - 47%, 1AESS - 20%)

The sample studied included 64 hunt groups, with 6,073 lines which represents approximately 6% of our total estimated ESP lines in service. Each ESP line was studied 24 hours a day, 7 days a week, for a minimum 4 week period. Two types of network usage studies were undertaken: 1) Traffic Data Report Service (TDRS) reports, and 2) Subscriber Line Usage Studies (SLUS). The studies began in February 1996 and concluded in August 1996. Data collected included PEG counts, attempts and usage.

Study Results

The study results clearly indicate that ESPs use the network much more intensively than other users (represented by total central office statistics). It should also be noted that the results of this study, while alarming, were gathered prior to major ISP flat rate offerings in December of 1996 and therefore may be understating the problem. Attachment 3 displays comparisons of the average minutes and average terminating attempts per line for each type of ESP. These are displayed for both the central office busy hour and the hunt group busy hour. As the charts in Attachment 3 demonstrate, the ESPs use their lines up to six times more than the office average during the office busy hour, and up to eight times more than the office average during the hunt group busy hour. Attachment 4 displays the average holding time per call for ESPs and compares it to the averages of 1FR, 1FB and 1MB customers.

Attachment 5 displays a comparison of the cumulative distribution of call lengths in Utah between ESPs and residence and business customers. As the results indicate, over 40% of ESP calls are longer than 5 minutes, while only 16% of residence and 8% of business calls are longer than 5 minutes. On the other end of the scale the differences are also obvious. Virtually all residence and business calls are completed within 30 minutes while over 15% of ESP calls are longer than 30 minutes.

Attachment 6 compares usage across a 24 hour time period. ESPs have consistently longer calls than typical residence and business users across all times of the day. During the peak busy hours for ESPs (10 p.m. to 5 a.m.), ESP calls were up to 14 times longer than business users and 5 times longer than residence users. During the business day, the ESP calls were up to 5 times longer than business users and 3 times longer than residence users.

Attachment 7 compares the average ESP usage per line (4 week sample aggregated to a single 24 hour period) with the average IXC usage per circuit (1 week sample aggregated to a single 15 hour period). The ESPs keep their lines consistently busy, from 20 to 45 minutes out of every hour. The average use of all lines during the whole 4 weeks was almost 33 minutes per

hour. IXCs, for comparison, also maintain high usage on their circuits, from 10 to 40 minutes during each hour studied. With an average of 25 minutes per hour, IXC usage per circuit is not as consistently busy as ESP lines.

These averages, while showing that ESPs use the network more intensely and for longer periods of time than the typical customers, don't reveal some of the other unique characteristics of ESPs. For example, with the exception of BBS, the terminating SLUS studies identified maximum holding times in excess of 17 hours (17 hours is an arbitrary limit established in the SLUS program to record maximum length of calls) in each state and ESP type. This substantiates the assertion that some customers are logging in and leaving their computers connected all day!

Averages can also mask the very concentrated usage observed with individual ESPs. This is demonstrated in attachment 8 which shows selected ESP usage over a single 24 hour period. As illustrated in this graph, MOU per line has extreme peaks of up to the entire 60 minutes per hour.

Another unique usage characteristic of ESPs is the time of day they use the network. Attachment 9 compares the busy hour distribution of the studied central offices to that of the ESPs. Studied central offices have 90% of their busy hours concentrated between 7am and 6pm. The chart on the right displays the percentage of busy hours in each time slot. Essentially, 11am and 4pm were the busy hours in the studied central offices. The graphs on the bottom of Attachment 10 show a quite different distribution for ESPs. The majority of the ESP busy hours (62%) are after 6pm. As the chart displays, ESP's usage peaks at 11 a.m. and 4 p.m. After 6 p.m., ESP usage shows a steady increase.

Conventional wisdom dictates that as long as there are only a few ESP lines in a central office, there shouldn't be a shift in busy hour (which then requires corresponding additional investment). However, with ESP usage 8 times as great as the normal business line, a relatively small amount of ESP lines could have a greater effect on the central office. In fact, Atai and Gordon state on page 3 of Bellcore's 1996 paper entitled, Impacts of Internet Traffic on LEC Networks and Switching Systems that, "...a scenario in which 4% of the lines are effectively blocked out (i.e., continuously occupied) produces a sixty-fold increase in the blocking experienced by exponential traffic."

As long as the ESP busy hour is not the same hour and has less usage than the office busy hour, a long run incremental cost study would not reflect that additional investments in the office are required to handle the ESP traffic. However, since calling rates and duration time per call to ESPs are different than for other calls, this leads to additional investments being made much sooner than they otherwise would have been.

Even though the actual usage going through the switch during the ESP's busy hour may not exceed that of the normal busy hour, traffic patterns are different and have dramatic effects on the interoffice networks - requiring trunk augmentation which could quite possibly never be required under normal busy hour traffic conditions.

An additional factor to consider is that ESPs tend to concentrate in the same area. In the Seattle/Olympia/Tacoma metro area, 87% of the ESP lines are located in 27% of the offices. As ESPs begin to congregate in a few central offices, not only would we see shifts in the office busy hour and the need for additional switching equipment, but the entire infrastructure in that area will be strained.

Another invisible impact of the usage behavior of these customers are the incremental usage costs incurred which are not covered by the rates paid. Attachment 10 displays the incremental usage costs per line associated with BBS, ISP, OLP, VAN and typical business customers. Current U S WEST TELRIC cost models assume approximately \$3 of monthly incremental usage costs for the average business line. As Attachment 10 reveals, ESP monthly incremental usage costs ranged from approximately \$5 (for BBS) to over \$24 (for ISPs), up to eight times that of a business line. These estimates do not represent the total additional investment that may be required to serve a particular ESP such as dedicated line units, excess construction charges, etc.

In the telephone industry, it is generally true that rates are based on "calling party pays." This supports the principle of cost causation and works well when the cost of a call is covered by the rate charged. This works even when charges are flat rated as long as, on average, costs for all calls are covered.

So, while it is theoretically true that calls terminated to ESPs are paid for by the originators of the calls, the costs of those calls are not reflected in the flat monthly rates paid by the call originators. Flat monthly rates are based in part on the cost of an average number of calls per month and the cost of an average duration of each call. At this time, calls to ESPs which are more frequent and last longer are not in the averages used for flat monthly rates.

In addition, flat monthly rates for residential customers do not cover their costs for a variety of reasons, primarily revolving around regulatory issues. So, to say that "calling party pays" applies does not mean that the cost of calls to ESPs are being covered by flat rates paid by the call originator.

Network Issues

There are numerous network issues in regards to ESPs. In this section I will attempt to list some of the major issues identified to date and quantify them where possible. I will start with a description of a typical ESP network and describe identified impacts on the loop, switch and trunking.

1) Typical Configuration: ESPs typically purchase end user products to connect to our central office. As an end user places a call with their modem to their on-line provider, they transit the PSTN to the ESP's modem bank via large multiline hunt groups provisioned with 1MBs, Centrex or DSS. The ESP typically connects to the Internet via private line services or frame relay. Many are now starting to collocate with IXC's. Some ESPs rent floor space

for their modem racks in suburban strip malls where real estate costs may be relatively inexpensive.

2) Excess Construction: While we are still developing methods to track ESP excess construction, U S WEST is seeing increases in special construction requests to connect ESPs and U S WEST. Our quotes to the customer are only for non-reusable costs, not the entire job cost, and is based on USWC's Reusable and Non-Reusable Plant Guidelines. With the large numbers of loops being ordered by ESPs, especially in suburban areas, stranded investment is a real concern if the ESP moves.

3) Switch Line Unit: Once an ESP's loop is connected, the next area where trouble is likely to occur is at the entrance to the switch. The analog line unit (LU), also referred to as a line concentrating module, is a switch unit which resides in the switching module (SM) and provides connections to customer lines via the main distributing frame. The LU provides the CODEC (Coder/Decoder) function where the analog signal on the subscriber loop is converted to a digital format for passage through the switch. The lines are concentrated and accessed by a crosspoint switch. The concentrator has 64 output lines, thus 640 telephone lines can be served with a 10:1 concentration (640 inward paths to 64 outward paths); 512 lines with 8:1 concentration; 384 lines with a 6:1 concentration and 256 lines with a 4:1 concentration.

Historically, residential and business subscriber lines are expected to generate 3 - 6 CCS, with residential lines at the lower end of the scale and business lines at the higher end. The PSTN is engineered around this expectation. For a typical residential switch, an 8:1 concentration ratio will handle the expected busy hour CCS and grade of service desired (i.e. % blocking).

As we learn more about ESP usage our engineering paradigms must begin to shift. The call holding time for voice traffic of 3 minutes cannot be applied to ESPs. These changes in traffic patterns make it necessary to re-visit the major assumptions behind many engineering algorithms related to switching systems (e.g. line and trunk concentration ratios) and trunk sizing. Not only are the loads on ESP lines heavier, but the usage has wide variances. The overall impact is that the network must be engineered more conservatively, which de-loads network equipment and decreases network efficiency and, of course, increases cost.

The impact on the placement of line units is enormous if ESP usage is taken into account. Normal concentration ratios of 8:1 are standard. With ESP usage averaging 19.1 CCS, a concentration ratio of only 1.3:1 should be used which, on a per line basis, is six times higher in cost than the standard. For example, 500 typical lines will fill one line unit. A similar number of ESP lines, engineered at 19.1 CCS require almost 6 line units. Put another way, we could handle over 3,000 typical new lines in the number of line units consumed by 500 ESP lines.

Recently, a request was received to provide 2,400 Centron lines for an Internet Service Provider. In the analysis of this request, USWC considered the unique usage characteristics of an ISP and the potential impact on other customers in the switch. We estimate that it

would cost over \$1.3 million in additional switching equipment to serve this one customer's 2,400 lines. To put this into perspective, the 49 line units being dedicated to one ISP's 2,400 lines would serve over 25,000 typical residential customers.

4) Interoffice: We have identified issues and that there are excessive ESP costs in the loop and switch. It follows then that there are impacts on interoffice facilities. We are now starting to see congestion in our interoffice trunking. Interoffice trunking may be added for a variety of reasons. If an ESP fails to order enough trunks, interoffice trunks become blocked due to modems automatically redialing. We also have encountered instances of drastic changes in traffic when customers from all over the city begin generating calls to a particular central office. This has occurred most recently when a well-known ESP began advertising alternative local numbers for customers who had been receiving busy signals - virtually overnight the traffic patterns for this entire customer group changed - affecting every part of the network.

While, at the time of this study, we had compiled only anecdotal evidence of increased interoffice facility costs, we can again look at standard engineering paradigms and see that the high ESP usage will have a corresponding impact on capital investment. A normal DS0 trunk and its associated circuit equipment would be engineered at an 8:1 ratio (8 lines per 1 trunk). With an engineered capacity of 22 CCS and ESP average usage of 19.1 CCS, we would use a ratio of 1:1 for interoffice facilities, or 8 times the average requirement!

Forecasts

Trying to forecast Internet growth or even current Internet usage is extremely difficult for several reasons. First, as our systems do not uniquely recognize Enhanced Service Providers, there is no automated method to track actual MOUs generated by ESPs. Second, when one turns to outside sources (i.e. magazine articles, speeches, etc.) the term Information Superhighway comes to mind.

Forecasts have been developed for both line growth and MOUs. To develop the line growth projections, Bellcore scoured various journals and Websites for articles with realistic growth projections. We then applied the annual average growth for each ESP type (ISP, VAN, OLP) to our ESP lines in service. As I have been unable to locate any forecasts for Bulletin Board growth I left their number unchanged from our current 1996 estimate.

MOU estimates were based on our terminating usage study. The per line averages for the various types of ESPs was multiplied by the number of lines to calculate total usage. This per line average was held constant throughout the forecast period.

Based on the study results, we have completed a conservative 5 year projection of ESP usage and lines. Starting with our 1996 estimate of over 98,000 lines, we expect ESP lines to more than double to 238,625 by 2001. Based on current line growth projections this equates to 0.63% of total lines in 1996 and 1.3% of total lines in the year 2001. ESP usage is estimated at 14.3 billion MOU, or 5.03% of total in 1996. This usage increases to over 34 billion MOU

in the year 2001 and accounts for almost 9% of total MOU. More aggressive forecasts estimate usage of almost 199 billion MOU in 2001.

Costs

1) Incremental Costs: An estimate was made comparing the estimated current monthly flat rate revenues received from ESPs against the incremental costs per ESP line. Flat rated revenues for VANs, ISPs, and OLPs were computed using a blended rate of Centrex, 1MBs, and 1FBs. For BBS, flat rated revenue was calculated as an average of 7 months of 1FR, CALC and touch tone revenues. Revenue increases year over year reflect the conservative growth rates previously mentioned. No increases in these basic rates were assumed. Capital costs per line were applied to the various ESP categories, again using the same growth figures.

Using this set of assumptions the 1996 loss was estimated at \$8 million, climbing to \$15 million in the year 2001. While these are only incremental cost differences, it is significant in that it shows the loss associated with this service under the current flat rated pricing plans.

2) Additional Line: Internal U S WEST data sources and research reveal the following information about second lines:

- Residential Second Line penetration has seen some increase over the past few years in U S WEST but uses for second lines are quite varied.
- We estimate that about 33 percent of homes have PCs; about 24% of homes have modems; up to 30% of homes perform some home office functions; 20% of homes have teens at home; and 16% of homes have heavy Internet users.
- The same line that serves as a home office line for voice and fax during the day may be used by teens for voice traffic in the evening, or Internet access in the late evening.

U S WEST has substantially contributed to its second line growth as a result of marketing efforts to increase second line penetrations and feature use on lines. Second line growth, therefore, cannot be presumed to be caused by Internet usage, due to this variety of needs created from home offices, Internet access, teens, elders, roommates, and other factors that drive second line purchases.

Usage on second lines for Internet access is substantially different than those of voice calls - which second lines are engineered for. As a general matter, with this type of usage, these additional revenues do not cover the added incremental costs.

3) Capital Investment: A major concern is the amount of capital investment which will be required to serve this growing group of customers. A conservative estimate is that in 1997, an estimated \$33 million in additional incremental capital will be needed to provision ESPs. Using our growth projections, this capital requirement climbs to \$72 million by the year 2001. Depending upon the mix of line side versus trunk side connections, the 2001 estimate could reach as high \$246 million. The same assumptions applied to our 1996 ESP forecast were used to develop these capital projections and include loop costs, line units, circuit equipment and interoffice facilities.

These projections assume that we will engineer ESP facilities to meet their unique requirements. If our engineering methodologies remain the same, estimated costs projected for line units, circuit equipment and interoffice facilities may be overstated as we will be filling line units and trunks at the current 8:1 ratio. Service problems however, will continue to increase and we will continue to operate in a reactive mode, investing in additional facilities in emergency situations.

Conclusion

This study has clearly documented that usage characteristics of ESPs, particularly ISPs, place a significant strain on U S WEST's circuit switched network. ESPs have high call volumes and long holding times, which result in additional incremental costs, as compared to typical residence and business end users. These usage characteristics, combined with the rapid growth of the Internet, create the need for quick, reactive capital deployment and switch line unit rebalancing to avoid serious network blockage for all users.

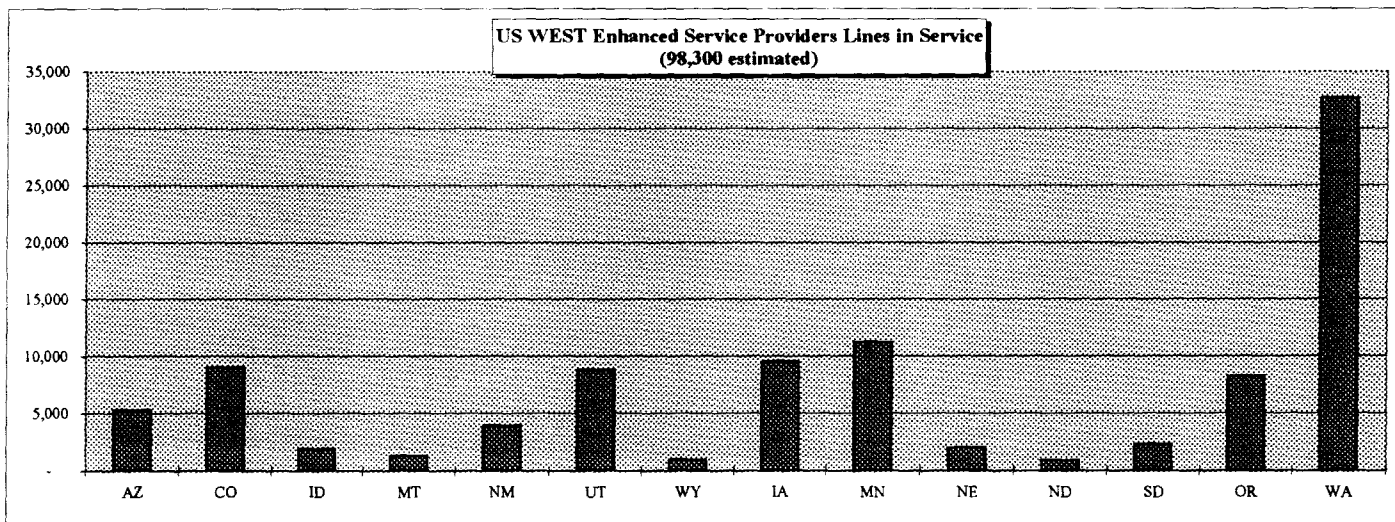
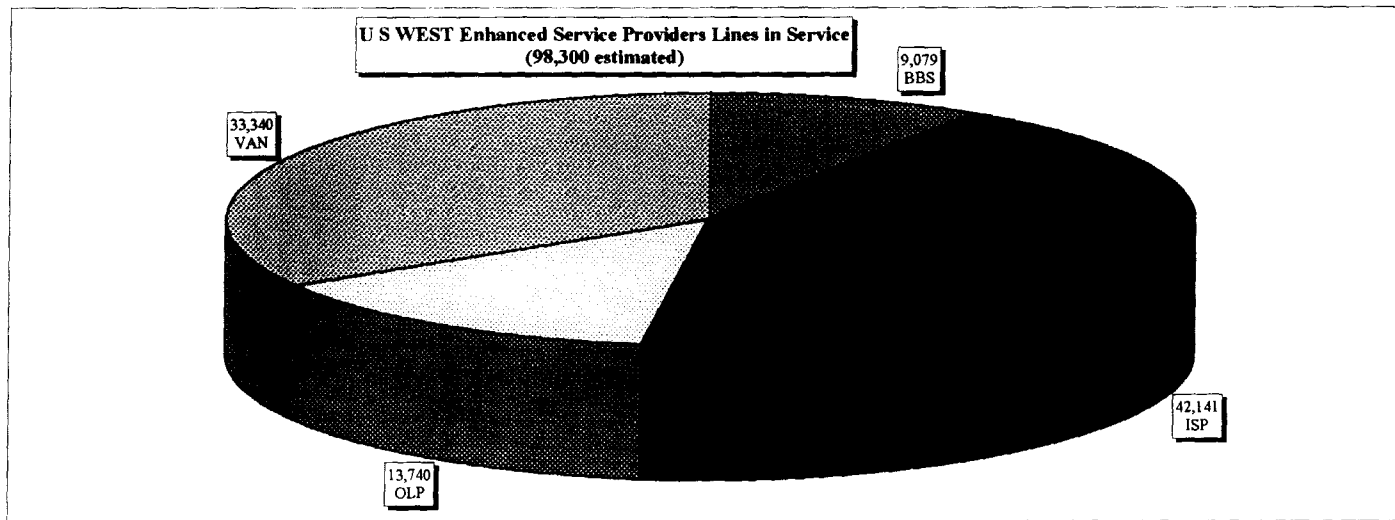
Attachment 1 Internet Background

The Internet began with packet switching projects in the late 1960's, most notably the Advanced Research Project Agency's ARPANET. During the 70's this network grew to support the Department of Defense, other government agencies, universities and research organizations. In 1985, the National Science Foundation funded several national supercomputer centers and a 56 kbps network linking them. It also offered to let any regional and national university computer centers that could reach this network to physically connect to it. This was the seed of the Internet network and the original reason to connect to it was to access supercomputer facilities.

In 1987, the National Science Foundation awarded a contract to Merit Network, Inc., in partnership with IBM, MCI, and the State of Michigan, to upgrade and operate the NSFNET (National Science Foundation Network) backbone using 1.544 Mbps leased lines. In September of 1990, Merit, IBM and MCI spun off a new independent non-profit organization known as Advanced Network and Services, Inc. (ANS) to operate this NSFNET backbone and tackle the challenges of moving to 45 Mbps speeds.

In May, 1993, the National Science Foundation issued a solicitation for bids in which they designed a series of Network Access Points (NAPs), where private commercial backbone operators could interconnect. In this way, anyone could develop a national backbone for the connection of LANs, sell connectivity to it, and use the NAP as the physical point where they interconnected and exchanged traffic with all the other service providers. Originally, there were 3 NAPs, there are now numerous others. On April 12, 1995, the NSFNet backbone was shutdown and the NAP architecture became the Internet.

The introduction of Mosaic, a browser which has a graphical user interface and uses HTTP (HyperText Transport Protocol) to move hypertext files across the Internet, was the spark which lit off the explosion of the Internet. Finally, ordinary users could search the vast spiderweb of computer networks and find information, the term World Wide Web (WWW) refers to this spiderweb of servers. More importantly, the information was displayed in much more than a simple text format, it included graphics rich screens and audio and video files which the user can download to their computer.



Key: BBS - Bulletin Board Service
ISP - Internet Service Provider
OLP - On Line Provider
VAN - Value Added Network